CROP TALK

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Heavy Equipment and Soil Compaction

by Greg Stewart, OMAF and MRA & Ben Rosser, University of Guelph

Can large tires and low inflation pressures solve all your problems?

Producers view soil compaction as a prevalent problem - a problem to be avoided, if possible. There are several main theories on how to avoid or manage soil compaction.

1. confine traffic to permanent lanes within the field in order to provide traffic-free zones for crop production,
2. avoid wheel traffic on wet soils which are susceptible to compaction,
3. use equipment with lower axle weights,
4. increase the size of the "foot print" by employing radial

Figure 1 *- Tire footprints and compaction profiles for a fully loaded 8,000 gallon Husky manure tanker (~21,000lbs/tire) fitted with Alliance Agri-Transport 35.5LR32 radial tires at 18PSI (left) and Firestone ANS Tractor 35.5L-32 bias ply tires at 32PSI (right). (Courtesy Sam Bradshow, Ontario Pork and 2013 North American Manure Expo.)*

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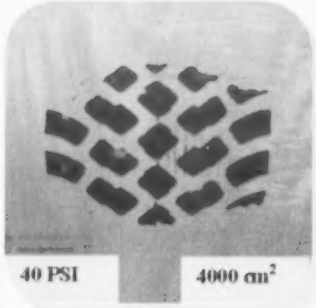
4. tires, larger tires, more tires, or tracks, and
5. reduce tire inflation pressures.

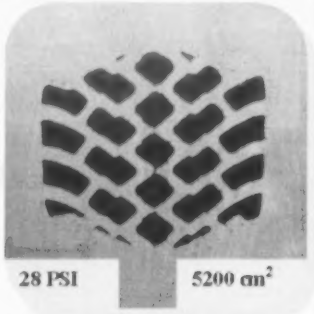
Considerable effort has been taken on the part of equipment manufacturers to do two of these, by increasing tire size and reducing inflation pressures. This lowers ground contact pressures so there is less soil rutting and compaction. Figure 1 illustrates where a loaded manure tanker with radial tires at 18 PSI (left) resulted in a larger foot print and a rut which was 10 cm shallower than bias play tires at 32 PSI (right).

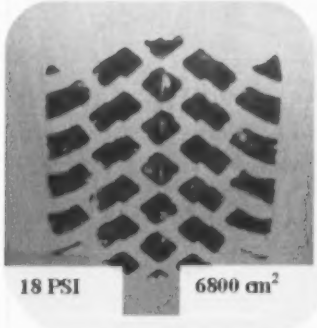
In well publicized compaction studies done at Ohio State University, the four wheel drive tractor operating at inflation pressures of 6 and 7 PSI resulted in less soil compaction than two belted track tractors. However, when this same tractor was operated at inflation pressures of 24 PSI, it caused the worst compaction in the experiment.

Certainly the use of larger foot print tires, with inflation pressure adjusted correctly for axle load, has been an important tool in reducing compaction risks. Figure 2 illustrates where the inflation pressure of a radial tire on a fully loaded manure tanker is reduced to meet minimum load bearing requirements from road speed (40 PSI at 25 MPH) to field spreading speed (18 PSI at 5 MPH). Being able to adjust tire inflation pressures at the field edge to maximize tire floatation for the slower in-field operating speeds has been common in Europe for years, but is just starting to get traction in Ontario.

***Figure 2** - Tire footprints for an Alliance Agri-Transport 35.5LR32 radial tire fitted on a fully loaded 8,000 gal Husky manure tanker (~ 21,000 lbs/tire) at tire inflation pressures of 40, 28 and 18 PSI. (Equipment courtesy of Husky Farm Equipment and the Alliance Tire Group)*







Total Axle Weight

What might get lost in this discussion is that soil compaction, particularly at depths a few centimeters below the surface, is also a function of total axle weight. Large tires with low inflation pressures cannot eliminate the potential for very heavy axle loads to cause compaction. Rutting or smearing may indeed be reduced by this type of running gear, but pressure distribution under these large tires can still negatively affect soil structure.

Soil compaction can be a yield limiting, expensive problem. Efforts should be made to avoid causing it in the first place. Proper tires with correctly adjusted inflation pressures can significantly reduce surface compaction. They are at least part of the solution for subsoil compaction threats as axle loads continue to climb.

Manure, Phosphorus and the Winter Landscape

by Christine Brown, Nutrient Management Lead, OMAF and MRA

BMP's suggest that seed placed fertilizer, residue management and cover crops will help prevent soil phosphorus from reaching water courses. Manure application requires extra attention to prevent phosphorus losses, especially during winter and snow melt conditions.

Phosphorus (P) is essential to plant growth. Crop root growth is most prolific in soils enriched with phosphorus, but too much of a good thing can have negative environmental impacts. When phosphorus enters a water course, eutrophication results. Eutrophication is when a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plants. This can lead to fluctuations in dissolved oxygen, which limits aquatic life. Sometimes phosphorus in bodies of water can lead to toxic algae blooms.

Crop production practices focus on seed-placed P to maximize nutrient efficiency. Management practices that leave 30 percent or more soil cover – crop residue or growing crops – helps to keep soil P in place. The highest risk for soil P loss from crop land results from intense storms and from rainfall during snowmelt.

Every winter season is different and there are wide range of winter conditions across the province. Research studying the fate of nutrients has resulted in more measurements during the winter and snow melt seasons. Nutrient movement from soils in winter is often higher than all the other times of the year combined. Figure 1: *Phosphorus in the Winter Landscape*, shows the potential fate of P when exposed to melting snow combined with rain and frozen or partially frozen soils. Water can't infiltrate or percolate a frozen soil, which results in overland flow. Under these conditions, the soil within the top 5 cm (2 inches) is unfrozen and saturated (mud) and can move easily with water as sheet or rill erosion.

Phosphorus in this layer can dissolve into the soil solution and leave the field as dissolved P. When soil phosphorus levels are high, the risk of dissolved P (also known as

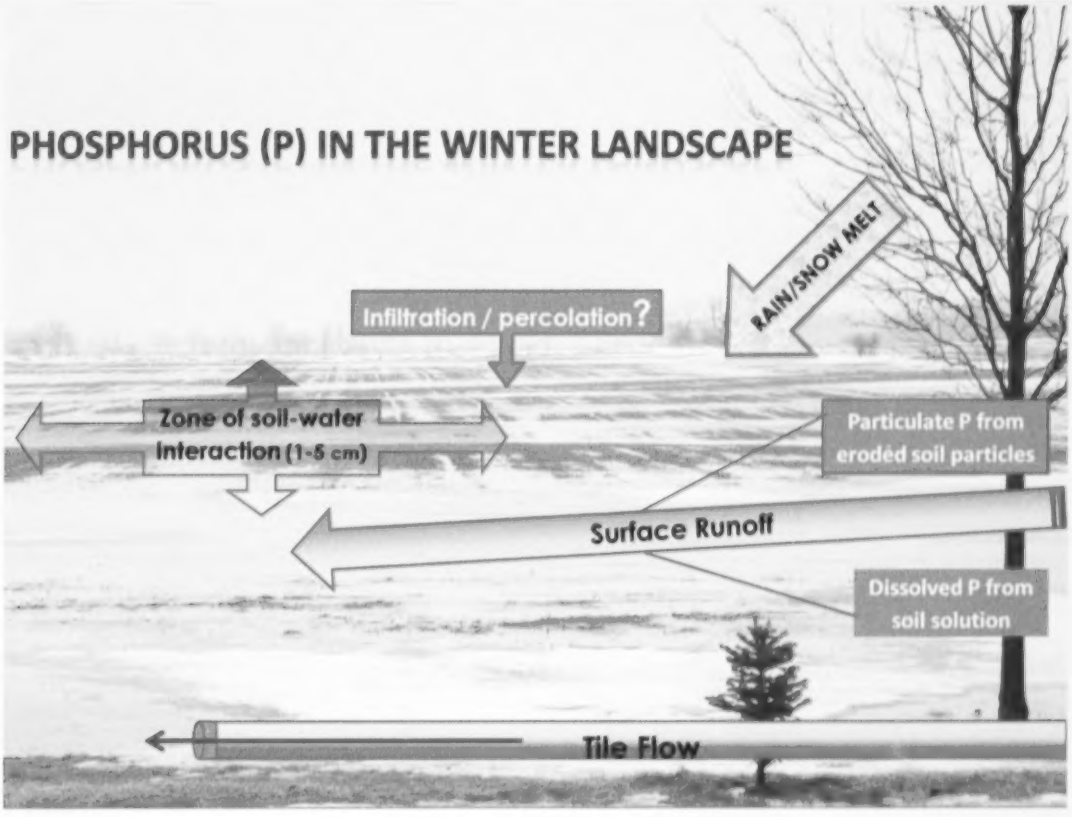

PHOSPHORUS (P) IN THE WINTER LANDSCAPE
RAIN/SNOW MELT
Infiltration / percolation?
Zone of soil-water interaction (1-5 cm)
Particulate P from eroded soil particles
Surface Runoff
Dissolved P from soil solution
Tile Flow

Figure 1 *- Phosphorus in the Winter Landscape*

soluble P) loss from the field is increased.

Where Does Manure Fit In This Picture?
In the winter landscape shown in Figure 1, an application of manure after crop harvest results in a higher amount of phosphorus in the root zone. When manure is surface applied and not incorporated, the phosphorus is concentrated in the top few cm of the soil. The higher the amount of P, the greater the risk of soluble P loss during winter runoff conditions. Where fall applied manure has been incorporated, the risk of soluble P loss is reduced. However incorporation can increase the risk of P loss in sediment (erosion).

Livestock manure and other organic amendments provide many crop nutrients to the soil. Management, therefore, must consider the bigger picture instead of only focusing on one nutrient. Both nitrogen (N) and P loss can lead to negative impact on the environment and management for one nutrient can increase the loss of the other.

No-till practices help to keep crop residue on the surface to reduce soil erosion. However manure applied to no-till soil in the fall is generally not incorporated, resulting in some of the nitrogen being compromised. On the other hand, colder soil temperatures slow down soil microbial activity, which reduces risk of volatilization loss. It also reduces leaching losses of N when manure is applied in late fall or injected/incorporated during the winter months. Although the risk of N loss is reduced, the risk of P loss is increased with the concentrated P levels near the soil surface.

Practices That Reduce Risk of P Loss From Manure:

- **Avoid winter application**! Even if the nutrients don't move to the water course, the nutrients most often don't remain where they were applied.
- Avoid nutrient application in areas of concentrated flow, or pathways where water flows during heavy rainfalls and/or snowmelt
- Calibrate equipment for accurate rate and uniformity of application
- Growing crops make the most efficient use of nutrients. Apply as close to crop needs as possible.
- Apply manure at rates that meet crop needs
- Apply manure to fields that have relatively low P fertility levels first.
- Incorporate manure - ideally leave greater than 30% residue cover
- Plant cover crops to help keep soil covered and hold nutrients.

Agricultural Sustainability - Who Defines It?

by Ian McDonald, Applied Research Coordinator, OMAF and MRA

The word "sustainability" is one of those overused words that have many different meanings, depending on who

you are or what you are trying to represent. Environmentalists use it, big business uses it, and the person on the street uses it. But what does sustainability really mean and why does it matter how it is defined? Sustainability is the noun form of the adjective sustainable. The online Merrim-Wesbters dictionary defines "sustainable" as 1 : capable of being sustained, 2.*a* : of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged <*sustainable* techniques> <*sustainable* agriculture> and 2.b: of or relating to a lifestyle involving the use of sustainable methods <*sustainable* society>.

Agricultural Sustainability

My definition of agricultural sustainability involves the interrelationship between agronomic, economic, environmental and social factors that result in a "successful agriculture". (Figure 1) All of the factors work together in an ever changing dynamic relationship. Although success may sometimes appear without balance between these factors, this success is likely superficial with longer term implications.

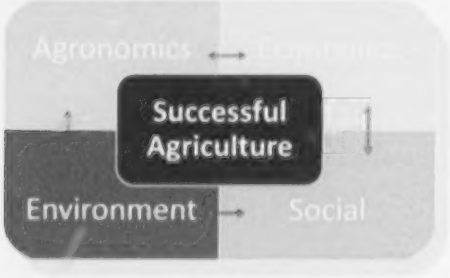


***Figure 1** - A Representation of the Dynamics of Successful Agriculture*

If you ask any farmer how things are in agriculture today, they will likely say, "best ever", or something to that effect. They point to strong crop prices, increasing yields, new equipment and technology, and increasing land values as some of the factors driving the "Agronomic and Economics" components of "Successful Agriculture".

But what about the other components of Successful Agriculture? Are we overlooking the environmental and social impacts of our present path?

Environmental Sustainability

As I drove around rural Ontario this spring working with farmers on field research projects, I saw a lot of country-side. It was easy to notice the larger fields and huge equipment on the fields and roads. But more subtly, there is also a significant increase in the amount of tillage. In parts of western Ontario, it was hard to find untilled or minimum tilled fields being planted into corn and soybeans and which had little if any residue. This is a concern because residues provide significant reductions in soil erosion potential (Figure 2).

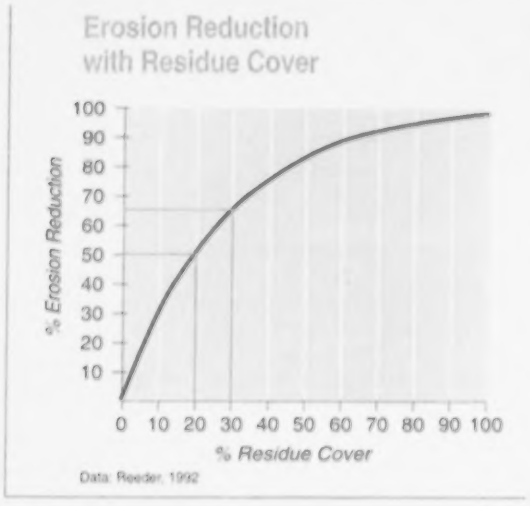


***Figure 2.** The Impact of Residue Cover on Soil Erosion Reduction.*

With the heavy rains in late-May, the amount of rill and sheet erosion on these fields was phenomenal. Even in areas with livestock and forage in the rotation, the amount of erosion was disheartening (Photo 1). We see continuing declines in the use of no-till and reduced tillage systems, despite extensive research suggesting little if any difference in productivity between no-till and conventional tillage systems (Figure 3),. Under recent rainfall patterns with less frequent but more intense rainfall events, even soils managed in the best way possible are susceptible to soil loss. Soil loss also occurs when dry soils are exposed to intensive tillage practices. Remember the dust storms of last spring?

Social Sustainability

What are our responsibilities as private landowners and tenants? We have care and control of land that is an important resource, but also impacts and potentially benefits all of society. How do we share the roads, water, and air that we all use?

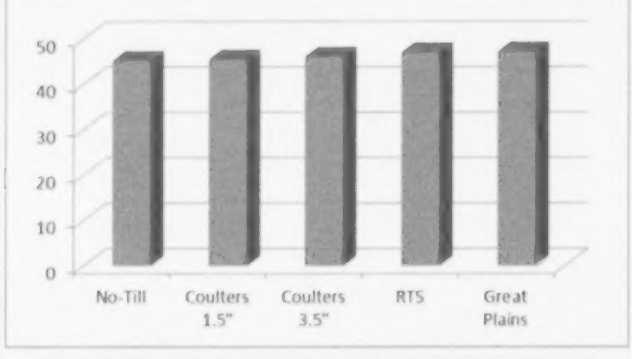
Businesses and organizations along the value chain are developing programs that producers must meet if they want to be clients and sell their products. The horticulture and livestock sectors are already facing this with programs such as HAACP. These are essentially "social licenses"! Some of these programs are quite onerous. Worse yet, what if our buyers all have different and conflicting requirements? Primary agriculture producers and related businesses represent less and less of the population. We will need to continue to address the social component of "Successful Agriculture ".

Photos 1 & 2 -
Recent Examples of Severe Erosion Occurring In Ontario Crop Fields

Photo 1

Photo 2

Figure 3 - *Ontario Soybean Yield Trial Results for Tillage Comparisons.*



Great PlainsTurbo-Till only used in 2006-07 (3 trials), Coulters attached to JD 1560 no-till drill) Bohner, 2013, (45 trials from 2003 – 2007).

I recently talked to Dr. Ralph Martin, University of Guelph Loblaw Chair in Sustainable Food Production, and Dr Terry Daynard, a well-known farmer, writer, and agricultural advocate. They both take holistic approaches to "Sustainability" and look to all the components in the success mix. They are developing networks of people and organizations across the agriculture value chains to create resilient sustainability platforms for agriculture. Both feel that without agriculture defining "Sustainability" for ourselves, someone else is going to do it for us, and we are unlikely to be satisfied with the outcome. Our actions on sustainability have to be as clear as our words. Terry Daynard discussed this at the FarmSmart Conference and his presentation is available at www.ghscia.com You can follow him on Twitter at @TerryDaynard. Ralph Martin has various thought provoking articles at www.uoguelph.ca/plant/faculty/rcmartin/.

Food for thought with all that extra free time you have in the tractor seat when you engage the auto-steer on these ever increasing fields sizes.

IPM Approach To Corn Seedling Insect Pests

by Gilles Quesnel, Field Crop IPM Program Lead, OMAF and MRA

Early season corn insect pests can significant impact stand establishment. Using an integrated pest management (IPM) approach to manage insect pests will help achieve good stand establishment, while minimizing the impact on the environment and reducing costs. An IPM approach will help determination if and when the use of an insecticide is needed. The decision will be based on the evaluation of the insect pest problem to determine when the benefits of using an insecticide exceed the disadvantages, measured in terms of cost and risk. Below are the main corn seedling pests along with scouting technique, action thresholds and management strategies. (OMAFRA Publication 811, Agronomy Guide, Chapter 13 and Publication 812, Field Crop Protection Guide)

Wireworm

Description: Wireworms are 7 - 35 mm (1/4 to1-1/3 inches) long, cylindrical, copper-brown coloured and hardened. (Figure 1) Due to their long life cycle, the wireworms can damage several successive crops by attacking roots, seeds and germinating corn seedlings.

Figure 1 - *Wireworm*

Risk Factors: Damage is usually worse in the second year after sod, following years with high grassy-weed pressure, or when corn and cereals are frequently in

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the rotation. They are more common in sandier soils, especially on knolls.

Scouting: Scout in mid-April using bait stations, a few weeks before planting.

Management: The action threshold is one wireworm per bait station. Use insecticide seed treatments in fields that have reached threshold, have a history of wireworm, or are following grassy sods. No rescue treatments are available. Controlling grassy weeds in crops previous to corn will help with prevention.

Black Cutworm

Description: Black cutworm larvae are greyish-black, about 3.5 cm (1-1/4 in.) long when mature. (Figure 2) In early spring, larvae will first develop on weeds and then move to corn seedlings. A corn plant attacked by cutworm may suddenly wilt because the stem has been hollowed out or fed on underground. Larger larvae cut off the plants at or just below ground level.

***Figure 2** - Black cutworm larva*

Risk Factors: These include a history of cutworm damage, presence of winter annual weeds such as chickweed and volunteer wheat before planting, no-till and heavy crop residue.

Scouting: Start once every 5 days as soon as corn emerges, looking for leaf-feeding pinholes by young climbing larvae as the first sign of damage.

Management: If more than 10% of corn plants show leaf feeding / pinholes, treating with a foliar insecticide will give nearly 100% control. The risk has passed when corn reaches the five-leaf stage and begins to produce roots at the base of the plant, Using seed treatments specifically for black cutworm control is not recommended, unless the field has had a continuous history of cutworm injury. For fields with a history of cutworm injury, consider planting Bt corn hybrids specifically for black cutworm control. In no-till corn fields, it is important to remove green vegetation that could attract the moths in early spring. Fall burndown of volunteer crops and weeds is recommended. Fields should be bare for at least 2 - 3 weeks before planting.

Corn Rootworm

Description: There are Western and Northern corn rootworm (CRW) in Ontario. (Figure 3) CRW eggs are deposited in the soil from July until a killing frost. Eggs over-winter and begin hatching in early June. Larvae feed on corn roots from mid-June to mid-July.

***Figure 3** - Western Corn Rootworm*

Risk Factors: These include fields which were in corn the previous year and had high CRW beetle populations, or were the latest planted corn field the previous season.

Scouting: Monitor 20 plants in five different locations in your field weekly from when the CRW adults emerge at the end of July to the end of August.

Management: Crop rotation is the best strategy. If crop rotation is not practical and there was more than one beetle per corn plant throughout the month of August, it may be necessary to either: plant transgenic CRW Bt hybrids, plant corn seed treated with high rate insecticide, or apply a soil insecticide to control CRW.

Corn Flea Beetle

Description: Adults are tiny (1.8 mm), black beetles. (Figure 4) Flea beetles are vectors of Stewarts' bacterial wilt, a disease that can cause corn plants to wilt or become stunted.

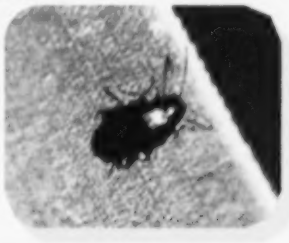

***Figure 4** - Corn Flea Beetle*

Risk Factors: Only hybrids and seed corn inbreeds susceptible to Stewarts' bacterial wilt show yield loss. Planting seasons following mild winters have higher beetle activity.

Scouting: For susceptible hybrids / inbreds, scout every 4-5 days after corn emergence. Inspect five sets of 20 seedling plants per field to determine beetle presence and density. Six beetles per 100 plants prior to the fifth-leaf stage warrants control.

Management: With susceptible hybrids and inbreeds, use insecticide seed treatments and avoid early planting dates and fields with a history of Stewart's wilt. Additional foliar sprays may be necessary for seed corn and susceptible hybrids if beetle populations are very high.

European Chafer

Description: Various types of grubs can attack field crops. (Figure 5) European chafer is the most common. Proper identification of the species is important because their different life cycle influences the management strategies needed. Grubs prune roots, causing plants to become stunted and eventually die. Fields near turf (lawns, golf courses and pasture) are particularly prone. Spring feeding damage by European chafer larvae starts in April and is completed by mid- to late May.

Figure 5 - White Grub Larva

Risk Factors: Sandier knolls where past injury was evident.

Scouting: Scout for chafers in the fall in standing soybean stubble fields. Scout for grubs on the sandier knolls and areas with past injury. Using a shovel, dig up 30 cm^2 (1 ft^2) of soil, 7.5-10 cm (3-4 in.) deep, in at least five areas of the field. Count how many grubs are found in each sample. The presence of two or more larvae per 1 ft^2 (30 cm^2) indicates the need for control.

Management: No rescue treatments are available for this pest. Cultural options include disturbing the soil by tillage or disking, which brings the grubs to the surface where they are exposed to the elements and natural enemies. For this strategy to be effective, plow in the fall before the grubs migrate below the plow depth. For corn, use an insecticide seed treatment that is registered for European chafer. If grub populations are high (i.e., four or more grubs per square foot), use the higher rate of an insecticide seed treatment. If the chafer population is extreme, avoid planting corn and plant soybeans instead.

Keeping the Soil Covered—Managing Crop Residues and Cover Crops

by Adam Hayes, Soil Management Specialist—Field Crops, OMAF and MRA

Protecting the Soil Over Winter

Fall harvest is almost complete. The crop has provided cover for the soil through the summer and early fall. Between now and next spring's planting, the soil will be exposed to pounding rains, overland flow from rain and melting snow, and high winds. All of these can cause significant soil loss and strip productive soil from areas within fields. That soil is lost and the productivity of those areas reduced. A few simple measures can go a long way to protecting your soil.

50% Residue Cover

One of the easiest things to do is to leave at least 50% of the soil surface covered with crop residues in the fall. A minimum of 50% cover of corn and cereal residue (Figure 1) will protect the soil in most situations. Lighter residues such as those from soybeans and edible beans, generally require a higher percent residue cover to provide adequate soil protection. To achieve this goal, do as little tillage as possible where residues have not been spread evenly. It goes without saying that leaving all crop residues on the soil surface will provide the most protection (Figure 2).

If there are areas of the field where concentrated overland flow erodes the soil every year, consider installing an erosion control structure. Assistance in the form of expertise and grants is available from many local conservation authorities and Growing Forward 2 funding programs.

Fall and Spring Management of Cover Crops

Cover crops are another practice that can help keep the soil covered over winter. By early-November, many annual cover crops will have been killed by frost, mowed, tilled, or had an herbicide applied. Radish and oats may not be killed by cold temperatures until mid-winter. Annual ryegrass and clover will usually survive the winter.

A living winter cereal cover crop can provide good soil protection over the winter, especially on lighter soils. Consider terminating cover crops now that will be alive in the spring and difficult to control in the following crop. This includes perennials (clover, annual ryegrass) and winter annuals (volunteer winter wheat).

Once the cover crop has been terminated, if the growth is not too thick and tall (Figure 3) it can be left until the following spring and no-tilled into or worked lightly. Many cover crops have high water content or are immature at termination, so they will desiccate and melt away to leave very little residue (Figure 4). If the cover crop growth is

significant, some fall tillage may be warranted, especially on finer textured soils.

***Figure 1** - 50% residue cover in the fall.*

***Figure 2** - Full residue cover in the fall.*

The goal is to keep the soil covered to prevent or minimize soil erosion. Manage crop residues and cover crops to provide that protection.

***Figure 3** - Oat and radish growth in the fall.*

***Figure 4** - The same field showing oat and radish residue in the spring on a clay loam soil. Corn was no-tilled into this in the spring*

Fall Forage Double Crop With Cover Crops

by Scott Banks, Emerging Crop Specialist, OMAF and MRA

Cover crops can meet your goal, whether it is to get more yield from the same acres, or to achieve '*at least 30% soil cover 100% of the time*'!

Chris & Kristen Moore of Kinburn, Ontario hosted a "Corn Silage for Sheep Field Day" on September 14, 2013. As part of the day, we had planted several potential crops that could also provide late-fall grazing. The crop species were:

- forage turnips (high and low seeding rates),
- fall cereal rye,
- winter wheat,
- spring wheat,
- oats,
- peas-oats-barley,
- common annual ryegrass,
- hybrid sudan grass,
- pearl millet and
- soybeans.

The plot area was cultivated prior to planting and then seeded with a conventional John Deere 8300 grain drill and trail packer on August 14th. This planting date fits the crop scenario where cover crops are planted following the harvest of winter wheat or spring cereals. Fifty pounds per acre of actual nitrogen from urea was broadcast across all plots. The first rainfall was about one week after planting. No herbicide was applied.

Results:

61 days after planting, each species was hand-harvest to simulate grazing and determine yield. The harvested material was then sampled to determine harvest moisture and analyzed for feed nutrient value. The pearl millet and soybeans were not harvested due to lack of top growth. Results are summarized in Table 1.

***Table 1** - The Harvest Moisture, Yield, Crude Protein and Relative Feed Value 61 days after from seeding*

Species	Harvest Moisture	Yield*	Crude Protein %	Relative Feed Value
Spring Wheat	86%	1.39	18.9%	123
Peas-Oats-Barley	95%	1.17	20.7%	135
Turnip—High Seedling Rate (combined leave & tuber)	94%	1.05	21.3%	n/a
Turnip—Low Seedling Rate (combined leave & turnip)	95%	0.51	24.7%	n/a
Oats	92%	0.73	19.5%	122
Winter Wheat	91%	0.61	22.8%	173
Annual Rye	94%	0.53	29.9%	218
Cereal Rye	94%	0.42	31.2%	212
Sudan	93%	0.21	19.8%	142

*Yield – metric tonnes per acre adjusted to 12% moisture.

Visually the turnips appeared to have the greatest yield potential, as the sheep will graze both the leaves and the tubers. We weighed the leaves and the tubers separately.

However, at this site the spring wheat yielded the highest, followed by the peas-oat-barley mixture. In other cover crop trials, spring wheat and oats have generally provided similar yields. Crops are shown in Figures 1-5.

***Figure 1** - Spring Wheat*

***Figure 2** - Peas-Oats-Barley Forage Mix*

Forage Turnips

The tubers made up about 40% and the leaves were about 60% of the total turnip yield (dry matter basis). The harvest moisture of all the species is quite high as indicative of the lush growth at this time of year. This high moisture, low fiber forage may require some dry hay or straw supplementation to provide sufficient fiber. It was also interesting to learn that turnips at a lower seeding rate produced a larger tuber. However, there was a significantly lower total yield of only 0.51 as compared to 1.05 tons per acre with the higher seeding rate. Turnips seeded at the high seeding rate had a variation in tuber size.

Hybrid sudan grass, pearl millet and soybeans are warm season species, therefore as demonstrated in this plot, these species planted late in the season would not be recommended due to lack of yield potential. Winter annuals such as winter wheat and fall rye cannot stem elongate until they have been vernalized by going through a winter, so their yield is quite limited when harvested the year of seeding.

On many farms, there is an opportunity to seed cover crops following winter wheat or a spring cereal crop such as spring wheat or oats. It should be noted that the harvested yields shown in Table 1 are from only one year at one location. Establishment costs (include seed, additional nitrogen, 1 pass cultivation and seed drill) range from $50 to $100 per acre, depending on seed costs .

***Figure 3** - Forage Turnip*

***Figure 4** - Forage Turnip - low plant density—Larger Tubers 15 October 2013*

These cover crops can provide 1 to 2 tons (dry matter) per acre of high quality forage in addition to the earlier grain crop in the same production year. These cover crops also provide the additional benefit of recycling crop nutrients, improving soil structure and reducing soil erosion, all to meet the goal of *'Wanted dead or alive! At least 30% soil cover 100% of the time!'*

Virus Diseases of Dry Beans On the Rise in 2013

by Brian Hall, Canola & Edible Bean Specialist, OMAF and MRA

Edible beans are susceptible to many virus diseases. In 2013, there were more reports of virus-like symptoms in grower fields. Virus diseases are a sporadic pest in dry beans. Yield losses are generally low, but individual field losses can be significant. Virus diseases become more prevalent in years when aphid populations are higher.

Virus Diseases

There are several viruses which can infect and damage dry beans in Ontario. The most common are:

- bean common mosaic (BCMV),
- alfalfa mosaic virus (AMV),
- bean yellow mosaic (BYMV),
- cucumber mosaic (CMV), and
- tobacco ringspot (TRSV).

Symptoms

Early symptoms of virus infection often mimic that of other plant stress and pest injury symptoms. The most common symptoms are a light-green to yellow mosaic (mottling) appearance of infected leaves, and distortion of leaves, including downward cupping and wrinkling. Infection of young plants can cause stunting, bunchy appearance and stem discolouration. Later infections can cause bud blight, top stem death, poor pollination, and misshapen pods. Virus infection through a field can cause uneven maturity and affect overall plant vigour and pod fill. Visual symptoms may appear similar between viruses, so only laboratory submissions can confirm which virus is present.

Spread By Infected Seed

Only BCMV and CMV are known to be spread through infected seed. In the US dry bean seed growing regions, field inspection for virus infection is a common requirement. BCMV, the most serious and common of the bean viruses, is principally spread through infected seed. All Ontario white bean registered varieties and most coloured bean types are resistant to BCMV.

Transmitted By Aphids

There are over 20 species of aphids (e.g. soybean, green peach, and pea) that can effectively spread virus infection throughout a field. Perennial legumes can act as a winter host for the viruses, and during the growing season host virus transmitting aphids. Virus diseases can also be spread by contact, or equipment that causes plant injury. Thrips have also been shown to be a vector for some viruses.

Management

1. Certified seed can help lower the risk through field inspection.
2. BCMV is the most serious edible bean virus, and the best control is to grow resistant varieties.
3. In years when aphids are a problem, late planting may increase the risk of serious infection.
4. Bean fields planted in close proximity to perennial legumes or vegetable crops may have higher risk of infection, as these crops may harbor bean viruses or virus spreading aphids.
5. Spraying dry beans for aphids will provide little protection against the spread of viruses. Winged aphids move readily and can quickly spread a virus in a field.
6. Seed-applied insecticides have not proven effective in reducing aphid transmission.

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